

## INCORPORATE MANURE INTO THE SOIL

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### *Description*

Incorporate manure into the soil using a plough, discs or tines.

### *Rationale, mechanism of action*

The rapid soil incorporation of manures can reduce the loss of P and FIOs in surface run-off. This is a mobilisation and delivery method. Incorporation of manure can reduce the detachment and entrainment of manure particles by increasing surface roughness, promoting infiltration and largely preventing the exposure of manure to the hydrological forces of raindrop impact, surface run-off and drain flow losses. Rapid soil incorporation of manure (i.e. within 6 hours of spreading for slurry and 24 hours for solid manures) also reduces the volatilisation of ammonia by reducing the exposure of manure to the air.

### *Applicability*

Applicable to the arable sector on all soil types and to maize growing in the dairy sector.

### *Effectiveness, including certainty*

**N:** Effects will be neutral if fertiliser rates take full account of retained N (i.e. N that is not volatilised) and the manure is not applied in the autumn. Manure applied in autumn adds N to the soil and increases the risk of loss because there is very little crop uptake at this time.

**P:** Estimated to reduce the manure component of P baseline losses by 19% on the sandy loam and by 13% on the clay loam soil. [1]

**FIOs:** No change, as there is simply a change in the loss pathway.

### *Time frame*

Both reduction of ammonia volatilization and effect on incidental P loss via runoff will take place immediately.

### *Environmental side-effects / pollution swapping*

Rapidly incorporating manures into the soil will reduce ammonia losses and will increase the soil mineral N pool that may be lost to water systems by nitrate leaching or to the air as nitrous oxide. If the rapid cultivation policy damages soil structure, this may compromise crop yields and result in applied mineral fertiliser and organic manure N being poorly utilised by crops and at risk of leaching over the next winter drainage period. When manures are incorporated, FIOs are protected from ultra-violet radiation and can survive for longer than if exposed on the surface. However, as they are mixed throughout the soil matrix, they are less likely to be lost in surface run-off or via drain-flow.

### *Relevance, potential for targeting, administrative handling, control*

*Costs: investment, labor*

For the arable farms, it is assumed that manure is applied shortly before the routine cultivation and there is, therefore, no additional cultivation required other than the cost of cultivation with tines or discs or ploughing. For grasslands, this method is intended for the re-seeded grass area and here that the cultivation or ploughing would be an additional operation, closely following application of the slurry.

*References*

- [1] Cuttle, S., Macleod, C., Chadwick, D., Scholefield, D., Haygarth, P., Newell-Price, P., Harris, D., Shepherd, M., Chambers, B. & Humphrey, R. (2006) An Inventory of Methods to Control Diffuse Water Pollution from Agriculture (DWPA) USER MANUAL. Defra report, project ES0203, 115 pp. p. 73-74  
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